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Fig-8.

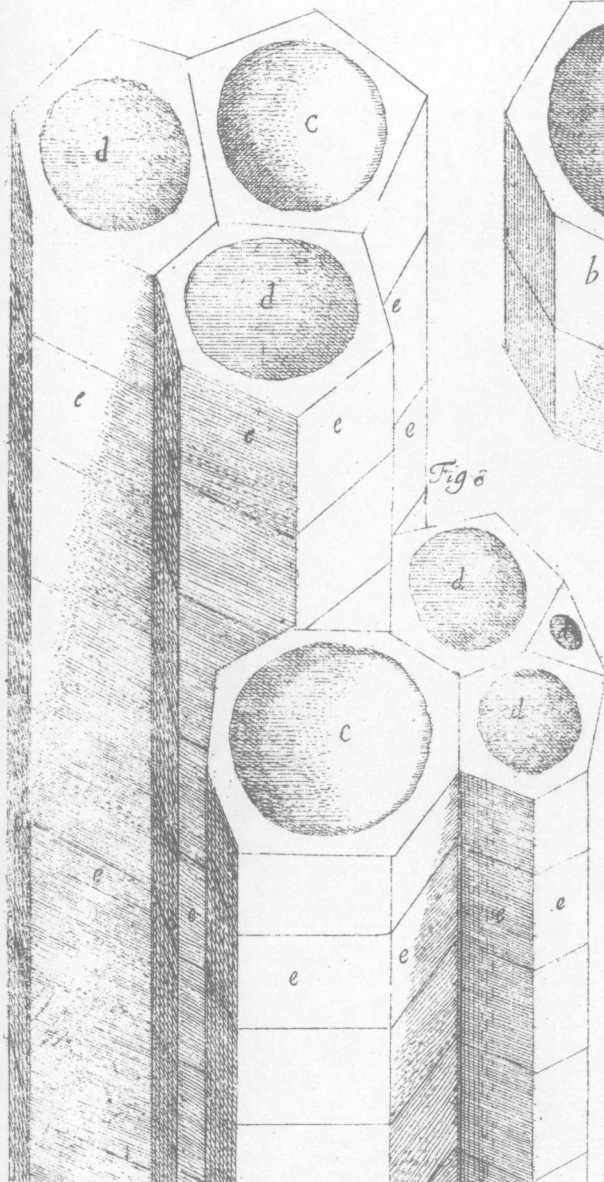


Fig-7.

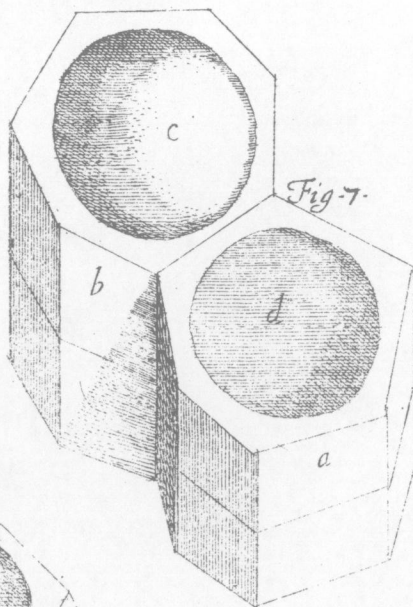


Fig-7.

Fig-6.

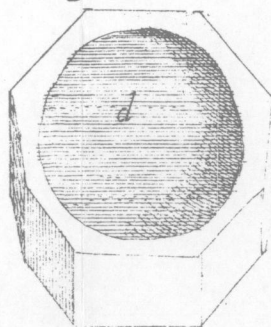


Fig-5.

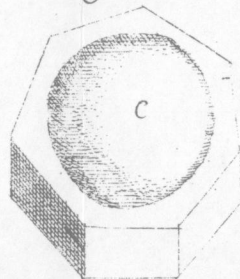


Fig-3.

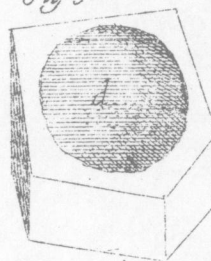


Fig-2.

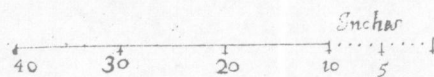
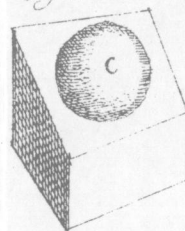


Fig. 9.

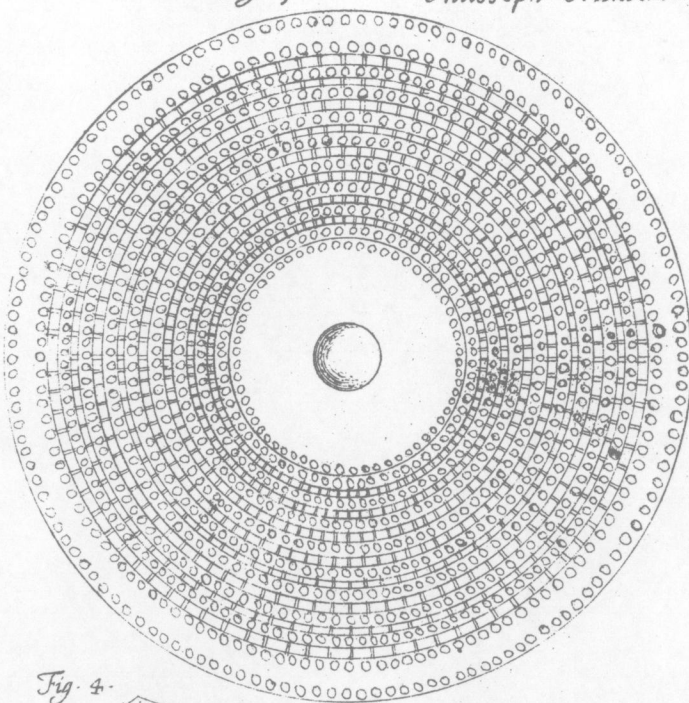


Fig. 6.

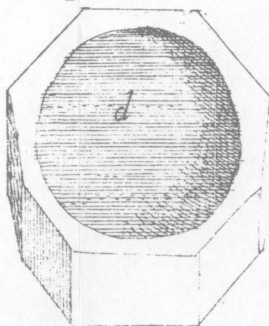


Fig. 5.

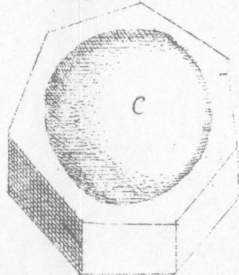


Fig. 4.

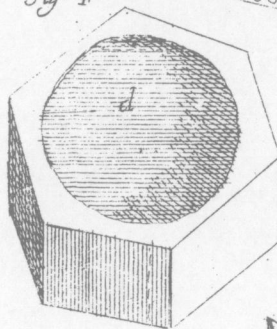


Fig. 6.

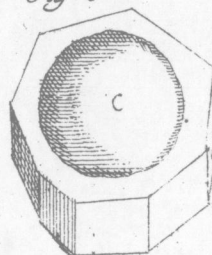


Fig. 1.

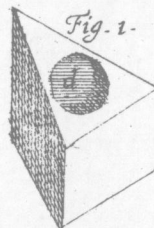


Fig. 2.

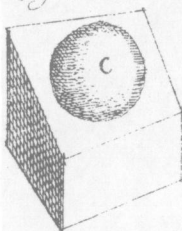
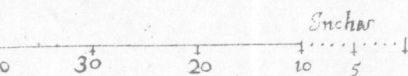


Fig. 7.



Fig. 3.



II. *A Letter from Dr. Thomas Molyneux, to Dr. Martin Lister, Fellow of the Colledge of Physicians, and of the Royal Society, in, London: Containing some additional Observations on the Giants Causeway in Ireland.*

Discourſing lately with our Friend, Sir *Richard Bulkeley*, I find that for ſome while I have been under an Obligation by a Promiſe he made in my behalf, that I ſhould ſend you a more true and particular Account of the *Giants Cauſway*, than has been yet publiſh'd: and indeed had I been in Circumſtances that would have duly qualified me for the Performance of this Task; the Returns I owe for the great Civilities you ſhewed me when I was in *England*, were Ingagements ſufficient to have made me ready, 'ere now, and extreamly willing to imbrace an Occaſion, ſo luckily put in my way, of gratifying your Curioſity.

But I defer'd hitherto giving you this ſo ſmall a Teſtimony of my Thanks, by reaſon I was ſtill in Hopes, that one time or other, ſome convenient Opportunity would preſent, that I might take a Journey into thoſe parts of the Country where it lies, and ſo be able to diſcharge my ſelf of this Office more to my own as well as your Satisfaction; for being an Eye-witneſs of this rare and ſurpriſing Piece of Nature's inanimate Workmanſhip, I might by a more diligent Search and Ocular Inquiry, correct ſome Miſtakes and Overſights I find committed by thoſe that have already deſcribed it; and add to their Obſervations ſuch farther Remarks, as might render the Image and Notions we have of the *Giants Cauſway*, ſtill more Compleat and Circumſtantial.

And truly whoever takes a Pleasure or Satisfaction in making Inquiries after Natural Productions, and examining the various Works of the Creation, cannot but be very desirous if he has once heard of this *Fossil*, to be as fully informed of it as 'tis possible, being 'tis so remarkably singular and curious in its Kind.

For if we consider how admirable it is, either for its Angular and regularly Shaped *Columns* ; or for the long Series of so many exact *Joints* in each of them ; or for the neat and curious *Articulation* of these Joints one into the other ; or for the vast *Height*, *Straitness*, and *Magnitude* of some of the Pillars, or for the great *Variety* as well as *Accuracy* of their *Geometrical Figures* ; or for the strange Combination of their *Sides*, in such a Manner as there is not the least Vacuity or Space left between one Column and another, they stand so close together ; or for the vast *Quantity* and spacious Extent of this sort of *Rock*, which tho' it is found in such an Abundance in this part of our Country, none of just the same Kind, for ought I can yet hear, is to be met with in any other part of the World: considering I say, all these Particulars, the *Giants Causeway* of *Ireland* may very well be esteemed one of the greatest *Wonders*, Nature, or the first Cause of all things has produced.

For though 'tis true she has manifested much greater Artifice and more curious Contrivance in the framing of *Animal Bodies*, and those of *Vegetables* ; as if these were designed to be more elaborate because more obvious and exposed to view and Observation ; yet in the modeling of her *Minerals* that lie retired, more hid and concealed in the Bowels of the Earth, we shall not find she has shewn any where so much Accuracy and Mechanism, as in the shaping the Materials of this our *Causeway*.

How-

However my Affairs have so unhappily fallen out, and I have had so little command of my own Time of late, that hitherto I have been forced to deny my self the Satisfaction of going to view this so curious a Natural Rarity in the Country where 'tis situated, and not being able to foresee or promise my self when it might be otherwise, I would not on this Score delay any longer answering your Expectations, and quitting my self of the Ingagements I lie under; but resolved at the Distance I am, to inform my self as well as I could concerning it, and then send you the best Account I could gather from all my Intelligence; which I hope will not be altogether unsatisfactory.

Tho' I have collected from several Informations by me, many remarkable Passages concerning this strange Pile of Stony Columns, yet I shall only here set down such Particulars as have come to my Knowledge since my writing of those Papers published in the *Philosophical Transactions*, Numb. 212. to which I refer you, as well for the rectifying some Errors therein mentioned, as to avoid unnecessary repeating what has been already said on this Subject.

Perceiving then I could not so well rely on the Draught of the *Giants Causeway* that was first taken, and printed about Four Years since in the fore-mentioned *Transaction*, as being done by the Hand of one who was no extraordinary Artist, tho' the best that could be then had; I proposed the last Summer to some Philosophical Gentlemen here in *Dublin*, that we should imploy, at our common Charge, one Mr. Sandys, a good Master in Designing and Drawing of Prospects, to go into the North of *Ireland*, and upon the Place take the genuine and accurate Figure of the whole Rock, with the natural Posture of the Hills and Country about it for some distance, accordingly we sent him away with such In-

structions as I drew up for him, and he returned soon after with a fair and beautiful Draught very expressive of each Particular we desired; an exact Copy of which my Brother lately sent over to the *Royal Society*, by one of their Worthy Members, and my highly esteemed Friend, the Honourable *Francis Roberts*, when he went last from hence, this I believe you'll find hanging up in their *Repository* at *Gresham-Colledge*, to which I must desire you to have recourse, for the whole *Map* was too large and bulky to be inclos'd in this Letter *: However, I have sever'd from it one of its most instructive *Schemes*, as being the chief and most essential part of it all, and have here sent it you; from whence with the Help of the Description already published, you will easily frame to your self a just *Idea* of the most singular and remarkable Properties of this Stone of the *Giants Causeway*.

See the Table.

Here you have exprest by the same *Scale*, all the various Figures of the several sorts of *Joints* and *Columns* that have been found by late careful Observation to make up the *Causway*.

Figure 1. shews a Joint but of Three Sides.

Figure 2. a Joint of Four Sides.

Figure 3. a Joint of Five Sides.

Figure 4. a Joint of Six Sides.

Figure 5. a Joint of Seven Sides.

* A Figure of this is Printed, *Numb.* 235. of these Transactions.

Figure 6 and 7. Two Joints one of a smaller, t other of a larger Size, that have both Eight Sides.

Figure 7, and 7. a piece of a Colum of Six Sides transversely divided in the Middle, the uppermost Part *a.* laid close by the lower Part *b.* that the Manner may the better and more plainly appear how the Convexity or rising of the Joint below markt *c.* was let into the Hollow of the Joint above markt *d.* when that was in its native Posture standing a Top and covering it, by this sort of Articulation the several Joints of the Columns, whether they consist of Three, Four, Five, Six, Seven, or Eight Sides adapt and unite themselves to one another, observe in all the rest of the Figures *c.* denotes a Convexity or rising, *d.* a Cavity or Hollowness in the Stone.

Figure 8, and 8. is a Collection of Seven Colums as they stand together in the *Causway*, and shews that tho' the Pillars differ from one another in their Shape and Angles, yet they adjust their Sides in such a Manner to the next immediate adjoining Colums, that there remains no Vacuity between them, for the Pillars are of such various Figures, that all sorts of Interstices of what shape soever, are intirely fill'd up by one or other of them.

e.e.e.e.e. The Sides of the Pillars which shew by their outward Surface, that each Colum consists of many Joints placed one above another from Top to Bottom; and these Joints so closely contiguous, that only a small Crevise or Line seems to sever them; some with their Convexities uppermost as those markt *c.* others with their Concavities as those markt *d.*

These

These Figures make out there was a Mistake committed as well in answering one of the *Queries* relating to this *Causway*, as in the Account that's given of it; where'tis said, that among the Columns *there are none square but almost all Pentagonals or Hexagonals, only a few are observed that have Seven Sides, but more Pentagons than Hexagons*, whereas 'tis certain, there are not only in this Pile *Quadrangular*, but also *Triangular* and *Octangular* Pillars, though no Notice was taken at that time of any such, by reason they are much fewer in Number than those other figured Columns, and not being carefully searched after, they did not come so readily in Sight, and my very honoured Friend, Dr. St. George Asb, now Lord Bishop of Clogher, assured me, that when he was on the *Causway*, he could not by all his Observation, tho' he examined the Matter strictly too, discover there were more Pentagons than Hexagons.

But this sort of Stone is not more remarkable for being cut thus naturally into regular Geometrical Figures, than for being found in such Plenty and vast Abundance in many parts of this Country, for Four or Five-Miles about. Other curiously shaped Stones as the *Trochites*, the *Astroites*, the *Lapides Judaici*, the *Echinite Pellucidi*, and such like, wheresoever discovered in the World, are always but few in Number, and only met with in small Parcels, scattered and dispersed up and down: But Nature has framed such an immense Quantity of this prodigious Stone here altogether, that she seems more than ordinary profuse of her elaborate Workmanship.

For besides what goes under the vulgar Name of the *Giants Causway*, which it self alone is of a great Extent, at least Seventy Five Foot longer than what 'twas first said to be, and how much farther it may run into the Sea,

Sea, none can tell ; there are many other Collections of the same kind of Pillars, situated in and about this Place, as two lesser but more imperfect and broken *Causways*, as we may call them, that both lie at some Distance o' the Left Hand of the great one, as you face the *North* : and a little farther into the Sea, some Rocks shew themselves above Water, when the Tide is low, that seem all made still of the same Stone. And if you ascend towards the Land in the Hill above the *Causway* next and immediately adjoining to it, you meet with more of the same sort of Pillars, but in a different Situation, not perpendicular and erect, but lying as 'twere on their Sides, in a slanting Posture.

Beyond this Hill Eastward, at several Distances stand many sets of streight and upright Columns ranged in curious Order along the Sides of the Hills : that Parcel of them which is most conspicuous and nearest the *Causway* the Country People call, the *Looms* or *Organs*, from its formal Shape ; which is so very regular, that all its several Pillars may be distinctly counted, and they are just Fifty in Number, the largest and tallest at least Forty Foot high, consists of Forty Four distinct Joints, and stands directly in the middle of all the rest, they gradually decreasing in Length on both Sides of it, like *Organ Pipes*.

Four Miles Westward of the *Giants Causway*, a Mile and a half distant from the Sea, Three Miles from the Town of *Coleraine*, and about Two from *Dunluce*, an old Seat of the *Marquesses* of *Antrim* ; several Ranges of tall Pillars shew themselves alongst the Side of a Rock for about Three Hundred Paces together : a Church within a Quarter of a Mile of them, called, *Ballywillan-Church*, I am told was built for the most part with Stone taken from these Pillars, which are all of the same sort of Stone with the Columns of the *Giants Causway*, (as I find by
care-

carefully examining and comparing together Pieces of them both I have now by me) and like those too, consist of regularly cut, loose, and distinct Joints, placed one upon the Top of t'other, but in these Respects they differ :

1. That some of these *In-land Pillars* are of a much larger Size than any in the *Causway*, being Two Foot and a half in Diameter :

2. That there are only found among these such as have Three, Four, Five, and Six Sides, none that have Seven and Eight like some of the *Giants Causway*.

3. That the Joints of these do not observe that kind of Articulation by *Cavities* and *Convexities* as those of the *Causway* do, but their upper and lower Surfaces touch only in *Planes*, and they stand united by means of their Weight and Pressure alone, so that a small Force will sever them.

Whether these Particulars may be thought sufficient to constitute a specifick Difference, or only an accidental Variety between the Stone of the *Giants Causway*, and of these more *In-land Pillars*, I leave to your greater Experience in these Inquiries to determine.

But in the mean time I must not omit informing you, that notwithstanding those regular *Cavities* or *Risings*, you see express'd in the Middle of every one of the Joints of the *Causway*, described in the foregoing Table, and though I have been assured by several that have been upon the Place, that the like *Hollows* and *Convexities* are in the Original Stones themselves; yet I find by observing the Manner of the Commissure or way of Articulation in Six Couple of the several sorts of Joints of Three, Four, Five, Six, Seven, and Eight Sides, which I had rais'd on Purpose, and taken out of the *Causway*, as they were there naturally fellow'd in Pairs, and was at the Charge

Charge of having them sent hither to *Dublin*, that I might have a compleat Set and Sample of all the various Columns the *Giants Causeway* affords; I say, observing of these, I find some of the Joints actually want this *Cavity* and *Rising*, as those of Four and Six Sides I have now in my House, and are only united to one another by Superficies touching close in Planes that run a little slanting and not parallel to the *Horizon*. Yet this may be only a chance Formation, since the universal Jointing of the whole *Causeway*, is certainly otherwise; but I must take notice, that the *Hollows* and *Convexities* are not constantly formed and moulded in the Stone with all that Accuracy and circular exactness the Artist has pleased to express them in the Figures.

These Cavities in such Joints as are uppermost, and lye exposed to the open Air on the Surface of the *Causeway*, afford no small Use and Advantage to the poorer sort of the People in the Neighbouring Country, with whom it is a common Practice in the Summer time, when they want Salt, to fill these natural Basons with Sea Water, which by reason of their Shallowness are of so commodious a Shape, that in the Space of Four *Tides* they find all the Water that was left in them exhaled, and the Salt remaining dry in the bottom of the *Hollows*. Yet whether some intrinsic Principle in the Nature and Body of the Stone may not contribute a great deal, as well as the outward Figure of its Cavity, to such a sudden Evaporation of the Water, and Crystallisation of the Marine Salt, in so Cold and Northern a Climate as this is, I leave to be further considered.

But there is another Irregularity I must take Notice of, which is, that One of the Joints of the *Causeway* a Pentagon sent me hither to Town, is Cavous, both at Top and Bottom: and I am told, among the other Figured Joints likewise, there are often found those that

are Convex as well at Top as at Bottom : But the general Formation that's most constant and runs through almost all the Pillars of the *Causway*, agrees with what is said in the fore-mentioned *Transaction*, viz. *That if a Joint be Concave at one End, the other End is always Convex.* And bating these Particulars I have hinted, I do not see any thing else said in that Account that you may not safely rely on.

The vast Towering Height of these strait Jointed Pillars, especially of those that are most slender and the perfectest among them, is truly very surprizing, and deserves yet a more particular Regard. There are in the *Causways*, some of Thirty Two, others of Thirty Six Foot High above the Strand, and as I said before, some among the *Organs* equal Forty Foot in Height : How far these may be continued under Ground is not yet discovered, nor has it been so well examined as it ought : A Gentleman of my Acquaintance in those Parts, did me the Favour lately to trace one of the tallest Pillars of the *Causway*, by digging into the Strand till he could well go no farther ; and it continued still of the same Make and Figure, Jointed as it was above, for the Depth of Eight Foot together, and could he then conveniently have gone on with his Design, and followed it deeper, he tells me he had no Reason to doubt but he might still have traced it much farther into the Earth. This is observable, that commonly the Joints as well of the *In-land Pillars*, as those of the *Causway*, as they have their Situation nigher the Earth, are longer and taller than those towards the Top of the Colum, but no difference is observed in the Cavities or Risings of the Joints, as they are placed higher or lower in the same Pillar, they continue much the same as to their Depth or Protuberance from Top to Bottom : yet the utmost Top of such of the Pillars that seem compleat and intire, always terminates

nates with a Joint that's flat on the upper Side, and no way either Concave or Convex like all the rest below it.

By what means these Stony Joints, so Ponderous and Bulky, and so distinct and discontinued Bodies from one another, should arrive at first to this great Height, and reach the Summits of these tall Columns where they now are placed, seems a Problem of that difficulty, that some perhaps for its Solution may be apt to think they were co-æval with the first Creation, and ranged then in the same Order they now stand by the great *Fiat* that produced the World. But it were easy to give another Conjecture of this odd Appearance, were I not better pleased to observe and set down the History of Nature as it truly is, than to amuse my self and others by making vain and uncertain Guesses at the hidden Causes of its *Phænomena*.

As to the internal Substance of this Stone, 'tis of an extraordinary hard, close, and compact Texture: its *Greet* or *Grain* so very even and fine that it hardly appears, unless viewed near the Eye, and when the Stone is newly broke; then it shews its self on its Surface like a very minute small glifning Sand thickly interspersed with the rest of the solid; which by reason its parts are so firmly combined together, has something more of Gravity in Proportion to its Bulk, than most other sorts of Stone, unless such as partake of the *Marchasite* or *Pyrates*, and are more ponderous than usual from a Metalline Principle being an Ingredient in their Composition; of which this does not at all participate or at least not in any considerable Quantity that I can discover.

It seems as as if it were one plain Homogenious Body, without any Mixture of *Cochlite*, *Belemnite*, Veins of *Spar*, or such like extraneous Matter, so commonly met

with in most other stony Concretes: nor can there be observed Rays, Furrroughs, Striæ, or any manner of Lines running along its Superficies; so that it is capable of a good Pollish, and I find has in Perfection that Quality of the *Lapis Lydius*, *Basanus* or *Touchstone*, so much celebrated of old, for shewing the various Impressions different Mettals make upon it when rub'd or drawn along its Surface; but being a Stone-naturally divided into small Pieces or Joints, and of so hard a Body, that it turns or breaks the Edges of the best Tools, when they offer to cut it; it seems unfit for the imbellishing of Houses, and all the other greater Uses of Architecture and Statuary.

Its Ruff and natural Outside that's expos'd to the open Air and beating of the Weather, is of a whitish Colour, much the same with that we see on common *Rocks* and *Lime Stone*; but the Inside, when you sever one Piece fresh from another, is of a Blackish Iron-grey, like that of the best Black Marble before 'tis polished, but somewhat of a darker Shade.

And indeed I can discover but little, if any, Difference between the Substance of this Stone, and that of Marble: 'Tis true, the most common sort of Marble is not near so hard and close a Body; yet that does not import much, since 'tis known that several Kinds of Marble vary extremely from one another in these Respects; for which we may take *Pliny's* Word, *Histor. Natural. lib. 36. cap. 7. Marmorum Genera & colores non facile est enumerare cum sint in tantâ Multitudine*: and a little farther in the same Chapter, speaking more particularly of the various Kinds of Marble, he mentions one sort of it found in *Æthiopia*, *Quem vocant Basalten ferrei coloris atque duritiæ unde & nomen*.

And

And truly the Stone of our *Giants Causeway* agreeing so well in Hardness, Colour and Substance with this *Æthiopick* Marble described by *Pliny*, and *Kentmannus*, reducing a sort of *Pillard Stone* in *Misnia* near *Dresden* in *Germany*, that nearly resembles ours in many of its Properties, to the *Basaltes* : I thought I could not more aptly refer it to any *Species* of *Fossil* yet known, than to that, and therefore gave it the Name of *Lapis Basaltes*, vel *Basanus Hibernicus*, but not being so well informed then, I ran into a Mistake, when I said, *Angulis minimum quinque plurimum septem constans* ; whereas I should have said, *Angulis minimum tribus plurimum octo constans* ; And this shews it to partake still more of the Nature of the *Misnian Basaltes*, tho' it comprehends Two sorts of Pillars which that has not, those of Three and those of Eight Sides.

This puts me in Mind of taking Notice to you, that I cannot but think that Gentleman extreamly out, whoever he is, for he conceals his Name, and perhaps would have done well had he his Opinion too, that publish'd a Paper, *Number 23. Page 46.* in the *Monthly Miscellaneous Letters*, where he says, the Stone of the *Giants Causeway* (which I am confident he had never seen) might rather be referr'd to the *Entrochi* than to the *Lapis Basaltes* or *Basanos*. Now the *Entrochi* you know are Cylindrical Bodies, and never Angular, always of a small Size, the largest not above an Inch Diameter, and their Solid quite of another Substance, a soft brittle Matter, much of the same Grain and Texture with the *Lapis Judaicus* : which are such signal and essential Characters to distinguish it from the Stone of the *Causeway*, that nothing would be more absurd in *Natural History*

story, than to reduce Two Minerals so vastly different, to one and the same *Tribe*; whereas I find no Disagreement that's considerable between the Columns of the *Basaltes Misenus* and those of the *Basaltes Hibernicus*, but that the former are made of One entire Stone, which in the latter is divided into Joints; and this I take as Grounds only sufficient to constitute a bare specifick Difference, and no more.

Georgius Agricola in his Book *de Natura Fossilium*, lib. 7. Pag. 327. has a Passage (and which I find confirmed too, by a later Author living in that Country, *Lachmand de Fossilibus*, &c.) wherein he mentions a sort of Marble found in the District of *Hildesheim* in *Germany*, that seems to bear in several Respects, a great Analogy or Agreement with this Stone of the *Giants Causeway*, because they are but short, I'll give you his own Words; *In Hildesheim quoque è Regione Arcis Marieburgi Collis est plenus Lapideis Trabibus, quarum Capita interdum eminent, sunt vero perlongæ acervatim positæ inque medio earum terra est colore Nigro, ferro aut altero Lapide percussæ non aliter ac marmor Hildesheimum cornu usti virus olent omninoque ex eadem Materiâ sunt.* He does not indeed tell us the precise Figure of these Marble Beams, yet it seems probable at least that some were Square, which makes him call them, *Trabes Lapideæ*. But however that might be, this I'm assured of from frequent Experiments, that the Marble of the *Giants Causeway*, like these *Stony Beams*, when forcibly struck with another Stone or a Bar of Iron, sends forth a strong offensive Scent like Burnt Horn.

But

But I shall forbear making any more of these kind of Remarks or raising Deductions from them, considering that I write to one whose accurate Observations, vast Reading, and ample Experience in Fossils, can, if he please, furnish me with those that are so much more Instructive and Judicious than my own : and shall therefore add no more, but intreat you to let me know your particular Sense of this wonderful Product of Nature, and your impartial Censure of what I have said concerning it ; and then I shall quite accomplish all that I proposed to my self by troubling you with this, the acquiring Knowledge, and shewing you that I am,

Dublin, March
25. 1698.

T O U R's, &c.